Mitigation Measure(s)
*None required***.**

4.5I-3 Impacts related to seismic hazards.

Vista Oaks

The Feasibility Geotechnical Report performed specifically for the project by Anderson Consultants, Inc., states that the property is generally considered to lie in an area of relatively low seismic activity. Active faults have not been identified on or adjacent to the property. The principal fault zones near the area are the Bear Mountain fault zone, approximately 13 miles northeast of the site, and the Melones fault zone, approximately 7 miles to the northeast. However, the report concludes that shaking due to seismic activity along nearby active faults could produce ground shaking at the site (Anderson Consultants, Inc, p. 3).

The Geotechnical Report states that other geologic hazards such as regional and local subsidence (densification of subsurface soils due to seismic activity) appear to be non-existent (Anderson Consultants, Inc, p. 4).

Highlands Parcel A

The City of Rocklin is located in an area known to be subject to seismic hazards. The Phase I Environmental Site Assessment, performed specifically for the Highlands Parcel A project by Youngdahl Consulting Group, Inc. in October 2002, states that according to the Fault Activity Map of California and Adjacent Areas, and the Map Index to Alquist-Priolo (Earthquake Hazard) Zones, active faults are not located on or adjacent to the project site. Local Foothills Fault System faults in proximity to the site include the Bear Mountain fault zone, located approximately 13 miles northeast of the site, and the Melones fault zone, approximately 7 miles to the northeast. The Foothills System is generally classified as "potentially active" (Youngdahl, p. 6). In addition, the Geotechnical Engineering Study performed for the Highlands Project, which included the project site, indicated that the project site is located within Seismic Risk Zone 3 (Zone 4 is the highest risk).

Vista Oaks and Highlands Parcel A

Liquefaction is a phenomenon during which granular material (silt or sand) is transformed from a solid state into a liquid state (i.e. quicksand) as a result of seismic activity. The primary factors deciding liquefaction potential of a soil deposit are: (1) the level and duration of seismic ground motions; (2) the type and consistency of the soil; and (3) the depth to groundwater. The Geotechnical Report states that seismic effects such as liquefaction and lateral spreading are not considered potential hazards throughout the majority of the

site due to the relatively thin surface soil and hard rock or cemented soil underlying most of the site. However, the report concludes that within the low lying, recent alluvial deposits, liquefaction could be a potential hazard due to the loose sands and near surface groundwater (Anderson Consultants, Inc, p. 4). Because liquefaction requires that soils be saturated or mostly saturated, liquefaction would most probably occur near Secret Ravine Creek. If liquefaction occurred, the proposed mixed-use trail along Secret Ravine Creek may be subject to lateral spreading or ground oscillation, which are the two types of damage caused by liquefaction on relatively level ground. The potential exists that damage to the trail could occur as a result of liquefaction.

Significant constraints to development related to groundshaking do not exist that cannot be mitigated through implementation of applicable regulations and codes and standard engineering practices. Implementation of UBC/CBC and local building code, and permitting requirements that are applicable to the project site would minimize the potential for adverse effects on people and property to occur due to seismic activity. Although the Vista Oaks and Highlands Parcels A projects would increase the number of people who could be exposed to seismic hazards, assuming compliance with all applicable regulations, standards, and codes, occupancy of the Vista Oaks and Highlands Parcel A projects would not expose people or property to any new or substantially different risks associated with seismic hazards than exist under current conditions.

The evaluation of potential seismic hazards is required by State law, and recommended measures to reduce the potential for life safety and property damage would be identified in a site-specific geotechnical study that would be undertaken prior to implementation of the Vista Oaks and Highlands Parcel A projects. In addition, prior to the issuance of building permits, the applicant would be required by State laws and regulations to demonstrate that the proposed development complies with all required regulations and standards pertaining to seismic hazards.

Existing building code requirements are considered adequate to reduce potential seismic hazards, including landslides, related to the construction and operation of the Vista Oaks and Highlands Parcel A subdivision projects to a less-than-significant level. The Vista Oaks and Highlands Parcel A projects would comply with the City's development review process and the City's Improvement Standards and Standard Specifications and the Uniform Building Code (UBC), which would reduce the impacts from potential seismic events.

Although the potential for liquefaction exists in certain alluvial soils along Secret Ravine Creek, no residential development is proposed immediately adjacent to the creek. Therefore, the Vista Oaks and Highlands Parcel A subdivision projects would result in a ***less-than- significant*** impact.

Mitigation Measure(s):
None required.

4.5I-4 Impacts related to groundwater seepage.

Vista Oaks and Highlands Parcel A

Shallow groundwater is expected to occur in the low-lying area surrounding Secret Ravine Creek. Groundwater could be expected at or near the elevation of the water in the creek. The Feasibility Geotechnical Report for Vista Oaks identifies the potential for high groundwater and surface seepage in low areas of the site (Anderson Geotechnical Consultants, Inc, p.7). Since Secret Ravine Creek runs through the northern part of Highlands Parcel A, shallow groundwater would most likely be found in Highlands Parcel A as well. The presence of shallow groundwater could have an adverse effect on the performance of proposed site improvements and could also impair grading and utility excavation operations if performed while such conditions exist. Therefore, groundwater seepage could result in a ***potentially significant*** impact.

Mitigation Measure(s)
Implementation of the following mitigation measure would mitigate potential impacts related to groundwater seepage to a *less-than-significant* level.

The following mitigation measure is identified for the Vista Oaks and Highlands Parcel A projects.

4.5MM-4 *Prior to any grading or construction activities, the City Engineer shall review the plans to ensure they indicate that if shallow ground water exists at the time of proposed grading, subdrainage shall be installed in advance of the grading operations to de-water soils within the depth of influence of grading to the extent reasonable. A qualified geologist and/or geotechnical engineer shall estimate the configuration and design of the subdrain systems during exposure of field conditions at the time of or immediately before construction. The contractor may also recommend an alternative which may be mutually agreed upon by the City Engineer and Public Works Director.*

4.5I-5 Impacts related to foundation support/expansive soil.

Vista Oaks and Highlands Parcel A

Construction of the proposed roadways and future construction of the houses would require solid building surfaces. Expansive soil creates the potential for

inconsistent soil settlement when bearing structural weight. The Feasibility Geotechnical Report for Vista Oaks states the surface soil observed in some areas within the project site may be potentially expansive. Much of the soil overlying the Mehrten Formation consists of sandy silt with clay, which can be potentially expansive. In addition, surface soil in the eastern portion of the site, particularly near lots 30 through 58, was also observed to have a significant amount of silt and clay, which indicates a potential for expansive soil conditions (Anderson Geotechnical Consultants, Inc, p. 5). The Preliminary Soils Report states that the project site is suitable; a secondary report will define the parameters of suitability. Due to the proximity of the parcels and similar surficial soils, the possibility exists that expansive soils could occur on the Highlands Parcel A site as well. Therefore, expansive soil could have a ***potentially significant*** impact.

Mitigation Measure

Implementation of the following mitigation measure would mitigate potential impacts related to foundation support/expansive soil to a *less-than-significant* level.

The following mitigation measure is identified for the Vista Oaks and Highlands Parcel A projects.

4.5MM-5 *Prior to the approval of the Improvement Plans or Final Map, the developer shall submit a design-level soil investigation for the review and approval of the City Engineer and Building Official that evaluates soil and rock conditions, particularly the potential for expansive soils. The professional engineer that prepared the soil investigation shall recommend appropriate roadway construction and foundation techniques and other best practices that are to be implemented by the project during construction. These techniques and practices shall address expansive soils or other geological concerns requiring remediation, including but not limited to:*

- *Recommendations for building pad and footing construction;*
- *Use of soil stabilizers or other additives; and*
- *Recommendations for surface drainage.*

4.5I-6 Impacts related to soil erosion.

Vista Oaks and Highlands Parcel A

Natural forces, both chemical and physical, are continually at work breaking down soils. Erosion poses two hazards: (1) it removes soils, thereby undermining roads and buildings and producing unstable slopes, and (2) it

deposits eroded soil in surface waters or on roadways. Natural erosion is frequently accelerated by human activities such as site preparation for construction and alteration of topographic features.

Based on an analysis of existing slopes and tree cover, the following two grading approaches were developed: (1) pad graded lots; and (2) limited graded lots. Grading, vegetation removal, as well as excavation and trenching for on-site and off-site utility lines, would disturb soils, which could increase the rate of erosion. Because of the variety of topography and natural features located within the two projects boundaries, the grading plan prepared for the projects by Terrance E. Lowell & Associates, Inc. has taken into consideration the natural topography of the project sites. As a result, proposed grading activities would be limited to construction of proposed roadway improvements, pad grading, and trail grading which would involve the grading of a total of approximately 32 acres for Vista Oaks and 8.79 acres for Highlands Parcel A. Grading Design Guidelines have been developed for the Vista Oaks project site because the proposed project includes partial graded pads that require guidelines. The Grading Design Guidelines are required for development in order to tailor grading activities to existing conditions. The Highlands Parcel A portion of the project site includes pad grading only which does not require implementation of the Grading Design Guidelines set forth for the Vista Oaks portion of the proposed project. Implementation of the measures identified in the California Building Code and the proposed projects' Grading Design Guidelines would ensure that erosion at the project site is minimized and grading is completed using BMP's (Best Management Practices), in addition to BAT's (Best Available Technologies) and site-specific recommendations.

The proposed projects would comply with City Construction Specifications, Improvement Standards, and standard Drawings, as well as the California Building Code, which requires preparation and implementation of an erosion-control plan, development or revegetation of exposed soil surfaces immediately after grading, and protection of disturbed areas in a manner to protect aquatic resources. Implementation of a construction stormwater runoff management plan would also help minimize erosion effects during construction. Although the project sites would comply with state and locals codes, construction-related activities would create erosion impacts on the project sites. Applicable State and federal water quality regulations and industry standard BMP's, which include erosion control measures, would be followed, but impacts to soil erosion would be considered ***potentially significant***.

Mitigation Measure(s)

Implementation of the Mitigation Measure 4.4MM-3a through -3c would mitigate potential impacts related to soil erosion and construction-phase soil

erosion at the Vista Oaks and Highlands Parcel A project sites to a *less-than-significant* level.

4.5I-7 Impacts related to shallow bedrock/rock excavatability.

Vista Oaks and Highlands Parcel A

The presence of exposed and shallow bedrock on the project sites could result in potential building constraints, which may include: the presence of large boulders and rock outcrops surrounding proposed housing and infrastructure sites which would hinder the construction of foundation/utility systems, and foundation excavations which would likely encounter loose boulders and possibly shallow soil which would not be suitable for support.

The exposed and shallow bedrock could pose excavation problems requiring special construction techniques, such as blasting, ripping, over-excavation, or drilling that may or may not result in fracturing of bedrock on or adjacent to the project site. According to the Feasibility Geotechnical Report and the Geotechnical Engineering Study-Update, the degree of difficulty with which rock can be excavated varies across the sites. Soil within the granitic rock (Mzd) should be excavatable to depths of 4 to 7 feet without difficulty. However, isolated knobs of unweathered granite should be expected at shallower depths (some are exposed at the surface). These isolated knobs may be very difficult to excavate and may require some blasting. In addition, the hard volcanic mudflow breccia (Tmv), which caps the higher portions of the site, only has .5 to 1.5 feet of soil cover. The shallow layer of soil can easily be excavated; however, it may not be possible to rip the underlying volcanic mudflow breccia (Tmv) with equipment smaller than a Caterpillar D9 tractor equipped with a single tooth ripper. Isolated areas within this rock layer may be non-rippable. A hydraulic hammer or blasting may be required to break up the rock prior to excavation. The conglomerate and sandstone (Tvc), which is located both above and below the volcanic breccia, would also be difficult to excavate, but it would be more easily ripped with larger grading equipment (Anderson Geotechnical Consultants, Inc, p. 6). Therefore, a ***potentially significant*** impact could occur.

Mitigation Measure(s)
Implementation of the following mitigation measure would mitigate potential impacts related to blasting to a *less-than-significant* level.

The following mitigation measure is identified for the Vista Oaks and Highlands Parcel A projects.

4.5MM-7 *If blasting activities are to occur in conjunction with the improvements, the contractor shall conduct the blasting activities in compliance with state and local regulations. The*

contractor shall obtain a blasting permit from the City of Rocklin prior to commencing any on-site blasting activities. The permit application shall include a description of the work to be accomplished and a statement of the necessity for blasting as opposed to other methods considered including avoidance of hard rock areas and safety measures to be implemented such as use of blast blankets. The contractor shall coordinate any blasting activities with police and fire departments to insure proper site access and traffic control, and public notification including the media, nearby residents, and businesses, as determined appropriate by the Rocklin Police Department. Blasting specifications and plans shall include a schedule that outlines the time frame in which blasting will occur in order to limit noise and traffic inconvenience. A note to this effect shall be included on the project's Improvement Plans.

Cumulative Impacts and Mitigation Measures

The cumulative context for the Geology chapter is based on various geological characteristics of the Rocklin General Plan study area and surrounding region. The cumulative analysis discussion of geology and soils evaluates the extent to which implementation of the proposed project and buildout of the Rocklin General Plan could result in temporary and permanent topographic changes that could affect erosion rates or patterns.

4.5I-8 Cumulative impacts related to the continuing buildout of Rocklin and surrounding areas as approved by the General Plan that could increase the potential for related geological impacts and hazards.

Vista Oaks

The Vista Oaks subdivision project would increase the number of people and structures that could be exposed to potential effects related to seismic hazards. Anticipated development of the Vista Oaks subdivision project would also increase the number of structures that could be subject to the effects of shallow depth to rock or expansive soils. Site preparation would also result in temporary and permanent topographic changes that could affect erosion rates or patterns. However, potentially adverse environmental effects associated with seismic hazards, as well as those associated with geologic or soils constraints, topographic alteration, and erosion, are usually site-specific and would not combine with similar effects that could occur with other projects in Rocklin, including Highlands Parcel A. Consequently, the Vista Oaks project would not be affected by, nor would it affect, other development anticipated under the City of Rocklin General Plan.

Highlands Parcel A

The Highlands Parcel A subdivision project would increase the number of people and structures that could be exposed to potential effects related to seismic hazards. Anticipated development of the Highlands Parcel A subdivision project would also increase the number of structures that could be subject to the effects of shallow depth to rock or expansive soils. Site preparation would also result in temporary and permanent topographic changes that could affect erosion rates or patterns. However, potentially adverse environmental effects associated with seismic hazards, as well as those associated with geologic or soils constraints, topographic alteration, and erosion, are usually site-specific and would not combine with similar effects that could occur with other projects in Rocklin, including Vista Oaks. Consequently, the Highlands Parcel A project would not be affected by, nor would it affect, other development anticipated under the City of Rocklin General Plan.

Conclusion

Because geologic and seismic impacts are usually site-specific, the cumulative impacts would be considered ***less-than-significant***.

Mitigation Measure(s)
None required.

Endnotes

[1] *Preliminary Soils Report, Vista Oaks Subdivision, Cities of Rocklin and Roseville, CA*, Blackburn Consulting, Inc., December 2001.
[2] *Phase I Environmental Site Assessment on Proposed Vista Oaks Residential Development*, Terra Search, Inc., November 2001.
[3] *Feasibility Geotechnical Report, Vista Oaks, Placer County, California*, Anderson Geotechnical Consultants, Inc., October 17, 1989.
[4] *Geotechnical Engineering Study – Update for the Highlands, Sierra College Blvd., Rocklin, CA*, Youngdahl & Associates, Inc., September 1999.
[5] *Secret Ravine Adaptive Management Plan, a Placer County Tributary of the Dry Creek Watershed*, Dry Creek Conservancy, December 2001 (available at http://drycreekconservancy.org/SRAMP/sr1.html)
[6] City of Rocklin General Plan, 1990 (p. 13).